SOLA4951, SOLA9451

Research Thesis A

Term 2, 2022

Course Overview

Staff Contact Details

Convenors

Name	Email	Availability	Location	Phone
Merlinde Kay	m.kay@unsw.edu.au	email to make an appointment	TETB room 215	+61 2 9065 5520
Murad Tayebjee	m.tayebjee@unsw.edu.au	email to make an appointment	TETB room 242	+61 2 9065 6128

School Contact Information

Engineering Student Support Services – The Nucleus - enrolment, progression checks, clash requests, course issues or program-related queries

Phone: (+61 2) 9385 8500 – Nucleus Student Hub

UNSW Future Students – potential student enquiries e.g. admissions, fees, programs, credit transfer

Course Details

Units of Credit 4

Summary of the Course

The thesis provides an opportunity for you to bring together engineering principles learned over your previous years of study and apply these principles to innovatively solve problems such as the development of a specific design, process and/or the investigation of a hypothesis. Thesis projects are complex, open-ended problems that allow room for your creativity, and the acquisition, analysis and interpretation of results. There are multiple possible solutions or conclusions at the outset and sufficient complexity to require a degree of project planning. The thesis requires you to formulate problems in scientific or engineering terms, manage an technical project and find solutions by applying scientific and engineering methods. You will also develop their ability to work in a research and development environment. You must identify a supervisor and project prior to enrolling in this course. This is the first course of the 3 course thesis structure.

Course Aims

The thesis provides an opportunity for the student to bring together engineering principles learned over their previous years of study and apply these principles to innovatively solve problems such as the development of a specific design, process and/or the investigation of a hypothesis. Thesis projects must be complex, open-ended problems that allow room for student creativity, and the acquisition, analysis and interpretation of results. There must be multiple possible solutions or conclusions at the outset and sufficient complexity to require a degree of project planning from the student. The thesis requires the student to formulate problems in engineering terms, manage an engineering project and find solutions by applying engineering methods. Students also develop their ability to work in a research and development environment.

Course Learning Outcomes

After successfully completing this course, you should be able to:

Learning Outcome	EA Stage 1 Competencies
1. Develop a design or a process or investigate a hypothesis following industry and professional engineering standards.	PE1.5, PE2.1, PE2.3
2. Critically reflect on a specialist body of knowledge related to their thesis topic.	PE1.1, PE1.3, PE1.6, PE3.2
3. Apply scientific and engineering methods to solve an engineering problem.	PE2.1, PE2.4, PE3.4
4. Analyse data objectively using quantitative and mathematical methods.	PE1.1, PE1.2, PE1.4, PE2.1
5. Demonstrate oral and written communication in professional and lay domains.	PE3.1, PE3.2, PE3.3

BE (Hons) and PG Program Learning Outcomes

1. Comprehensive, theory based understanding of the underpinning natural and physical sciences and the engineering fundamentals applicable to the engineering discipline.
2. Conceptual understanding of the mathematics, numerical analysis, statistics, and computer and information sciences which underpin the engineering discipline.
3. In-depth understanding of specialist bodies of knowledge within the engineering discipline.
4. Discernment of knowledge development and research directions within the engineering discipline.
5. Knowledge of engineering design practice and contextual factors impacting the engineering discipline.
6. Understanding of the scope, principles, norms, accountabilities and bounds of sustainable engineering practice in the specific discipline.
7. Application of established engineering methods to complex engineering problem solving.
8. Fluent application of engineering techniques, tools and resources.
9. Application of systematic engineering synthesis and design processes.
10. Application of systematic approaches to the conduct and management of engineering projects.
11. Ethical conduct and professional accountability.
12. Effective oral and written communication in professional and lay domains.
13. Creative, innovative and pro-active demeanour.
14. Professional use and management of information.
15. Orderly management of self, and professional conduct.
16. Effective team membership and team leadership.

Teaching Strategies

The course is taught as an individual research project, to develop a level of research skills and autonomy.

Additional Course Information

Contact Hours, Contact Details, and Consultation times

There are no formal lectures for this course. Students should stay in contact with their nominated supervisor throughout the three thesis terms, perhaps at a pre-organised weekly meeting time. If a student would like to contact their supervisor outside of a pre-organised weekly meeting, email is the preferred method of contact.

The School would also like to arrange a seminar during thesis B, provided that enough students are interested in attending. The seminar would provide students with information about writing a thesis. Students will be contacted about this in due course.

Please see the course [Moodle](#).

Important Links

- [UNSW Handbook](#)   [UNSW Timetable](#)
- [Health and Safety](#)   [Engineering Student Support Services Centre](#)
- [Student Resources](#)   [UNSW Photovoltaic and Renewable Energy Engineering](#)

Course Details

The normal workload expectations of a student are approximately 25 hours per term for each UOC, including class contact hours, other learning activities, preparation and time spent on all assessable work.

You should aim to spend about 6 hr/wk on this course. The additional time should be spent in making sure that you understand the material, completing the set deliverables, further reading, and planning.

Thesis Guidelines

- The prerequisites for Thesis B (SOLA4952) and Thesis C (SOLA4953) are Thesis A (SOLA4951) and Thesis B (SOLA4952), respectively.
- With School/course co-ordinator permission, students may take Thesis B and C together. This option is be limited only to students who can demonstrate the ability to progress. This will require a prerequisite waiver to waive the Thesis B requirement for Thesis C.
- **Students must take Thesis courses in consecutive terms,** unless exceptional circumstances are demonstrated by the student through the standard channels and accepted by the School. If a student fails to do this a penatly will apply of a 30% reduction in assessment marks for the thesis course.
- Thesis A and B will initially carry a 'satisfactory' (EC grade) or 'not satisfactory' (EF grade). A student's final Thesis mark for A, B and C will reflect the overall weighted percentage of marks achieved during all three courses once Thesis C is completed, and the earlier EC grades will be replaced with the final mark at that time. A student MUST pass each thesis course to be allowed to move onto the next stage.

School Prizes

Two School prizes are associated with this course for UG students:

1. The Photovoltaics Thesis Prize for the best performance in an undergraduate thesis in the area of photovoltaics in the Bachelor of Engineering program. This prize is a cheque for $500.
2. Renewable Energy Thesis Prize For the best performance by an Undergraduate student in a Renewable Energy Thesis. This prize is a cheque for $500.
https://my.unsw.edu.au/student/prizes/PrizesEngineering.html#SchoolofPhotovoltaicandRenewableEnergyEngineering

Health and Safety

The University has a legal obligation to provide a healthy and safe workplace for employees and students. Students must follow reasonable directions of their supervisors and the Course Coordinator.One way in which our safety is protected is through the preparation, review and approval of Risk Assessments. Students intending to carry out practical work are required to prepare or otherwise obtain a Risk Assessment for approval by their supervisor and by the Space Manager in whose space the work is to be done. Risk Assessment templates for SPACES, EQUIPMENT and PROCEDURES are available on the moodle site. Risk Assessments and examples are already available, through your supervisor for many activities. Completed or modified versions should be submitted as signed hard copies and MS Word electronic versions to Kian Fong Chin (kf.chin@unsw.edu.au).

Assessment

Assessment Overview

Thesis A: It is intended that Thesis A cover the scoping, planning, and completing preparations for the project.

1. Project Plan – this will comprise a 1-2 page document explaining the justification for their project, a rough layout of a plan of work throughout the project, including any software, methods etc., they need to be trained on. (Thesis A)
2. Literature and Progress review– this should comprise the relevant literature and background of the topic, the problem statement and motivation for the work and a detailed research plan. For details of what to include see below in Assessment.

Thesis B: The primary intention behind Thesis B is to ensure students stay on track with their projects and project work as they progress through the year.

1. Progress update – a form on moodle where you update your progress, and talk about any obstacles or changes to your original plan.
2. Seminar Presentation – The seminar should include overall aim of project, intended outcomes, a progress report including a detailed methodology, and preliminary results.
3. Progress Report – this should comprise a thesis table of contents outlining the structure of the thesis. A 2-5 page summary on goals and tasks accomplished and future work

Thesis C: Thesis C continues the project work. The key deliverable is the Written Report.

The following course assessments relate to the student's research planning, conducting the research project and writing the thesis document, and disseminating the results in different forms.

1. Participation – assesses the students commitment and engagement to the project assessed by the supervisor - see participation criteria document. (Assessed over Thesis A, B and C)
2. Final Report – the final thesis document (Thesis C)
3. Dissemination of work – Students will participate in an online 3-minute thesis presentation presenting their work (Thesis C)

Overview of all deliverables is below, specific due dates for each term, as well as the criteria will be found in each terms course outline.

	Assessments	Due Week	Contribution to final mark	Assessed by
Thesis A	1. Submit nomination form	1	Loss of 2% out of 10% participation mark if not submitted	Thesis Co-ordinator
	1. Project Plan	3	Loss of 2.5% out of 10% participation mark if not submitted	Supervisor
	1. Literature and Progress Review	10	10%	Supervisor/Assessor (50/50)
Thesis B*	1. *Progress Update	3	Loss of 2.5% out of 10% participation mark if not submitted	Supervisor
	1. Seminar Presentation 2. Progress Report	7	10%	Supervisor/Assessor (50/50)
		10	5%	Supervisor
Thesis C	1. Final Report 2. Participation 3. Presentation of work	10	60%	Supervisor/Assessor (50/50)
		10	10%	Supervisor
		10	5%	Supervisor/Assessor (50/50)

NOTE: For Thesis A,B mark will be EC, and a final mark is given in Thesis C taking into account the breakdown.

* For any student wanting to complete Thesis B and C concurrently, additional assessment criteria will be put in place. It will be expected that any student requesting this will be at the stage of submitting 1. the literature review with preliminary results included. They must be at a DN level for all aspects to be allowed to move to finishing in two terms. 2. the progress report document will be due week 3 of term 2 of thesis, if not at a DN level the student will have to go back down to thesis B only.

Any late assessments will incur a 5% penalty per day.

Thesis A will be graded either satisfactory (EC) or unsatisfactory, and only students with a satisfactory grade will be permitted to proceed to Part B.

Work submitted late without an approved extension by the course coordinator or delegated authority is subject to a late penalty of 5% per day of the maximum mark possible for that assessment item, per calendar day.

The late penalty is applied per calendar day (including weekends and public holidays) that the assessment is overdue. There is no pro-rata of the late penalty for submissions made part way through a day.

Presentation

All submissions are expected to be neat and clearly set out. Your results are the pinnacle of all your hard work and should be treated with due respect. Presenting results clearly gives the marker the best chance of understanding your method; even if the numerical results are incorrect.

Marking

Marking guidelines for assignment submissions will be provided at the same time as assignment details to assist with meeting assessable requirements. Submissions will be marked according to the marking guidelines provided.

Assessment task	Weight	Due Date	Course Learning Outcomes Assessed
1. Thesis Nomination Form	N/A	30/05/2022 09:00 AM	
2. Project Plan	N/A	17/06/2022 05:00 PM	1
3. Literature Review and Project Plan/Progress	10%	03/08/2022 05:00 PM	1, 2, 5

Assessment 1: Thesis Nomination Form

Submission notes: Submit form on Moodle and add your name to the database
Due date: 30/05/2022 09:00 AM

Have a thesis nomination form signed by your supervsior and register yourself on Moodle in the Thesis database and upload your signed form to Moodle.

Assessment criteria

No Marks lost if handed in on time, if late, a loss of 2% from your supervisor participation mark.

Assessment 2: Project Plan

Assessment length: 1-2 pages
Submission notes: Please submit a copy to your supervisor and in the assessment box on Moodle
Due date: 17/06/2022 05:00 PM

Project Plan – this will comprise a 1-2 page document explaining the justification for their project, a rough layout of a plan of work throughout the project, including any software, methods etc., they need to be trained on.

Assessment criteria

Loss of 2.5% out of 10% participation mark if not submitted. No marks lost if submitted on time. Feedback will be given by your supervisor.

Assessment 3: Literature Review and Project Plan/Progress

Assessment length: 16-22 pages
Submission notes: Submit document as a pdf to Moodle
Due date: 03/08/2022 05:00 PM

Literature and Progress review– this should comprise the relevant literature and background of the topic, the problem statement and motivation for the work and a detailed research plan. For details of what to include see below in Assessment.

Assessment criteria

Below are things to consider when putting together the literature and progress review document

Criterion	Tasks	Weighting	Pages
Literature Review	(*What is the problem to be solved, and its significance?*) • Brief background to project • Summary of literature relevant to project • Identification of "gaps" in the literature • Problem Statement (informed by gaps in the literature) • Hypothesis and aims	50%	12-15
Project Plan	(*How will the student answer the research question in the given time using their available resources?*) • Proposed Solution/Experimental Methodology • Thesis timeline – for next two terms ○ Justification of time allocation for each task • Available resources identified • Required training and upskilling identified	20%	3-5
Project Dependent Preparations	(*Can the student achieve the aims in the timeline? What progress has been made already?*)	20%	1-2

	Project specific, but may include • Evidence of training on specific equipment • Evidence of some upskilling in new software/methods • Preliminary results • Preliminary sketches • Components/parts ordered • Detailed budget of parts to be ordered • Risk Assessment		
Document Presentation	• Report or slide structure and layout • English skills – spelling, grammar • Data presentation (if applicable) • Clarity of writing • Citations consistent and correctly formatted	10%	N/A

Hurdle requirement

NOTE: A fail in Thesis A will require students to re-enrol in Thesis A again.

If there is a significant difference between the marks for the literature and progress review, the supervisor and assessor will be asked to discuss the marks and to come to an agreement. If this is not possible, a second assessor will be appointed. The two marks that are closest to within 10 will be taken.

Attendance Requirements

Course Schedule

There are no lectures for this course. Please make sure you stay in contact with your supervisor. It is your responsibility to arrange regular meetings and stay up to date with all deliverables for thesis.

[View class timetable](#)

Timetable

Date	Type	Content
Week 1: 30 May - 3 June	Assessment	Thesis Nomination Form: Submit form on Moodle and add your name to the database
Week 3: 13 June - 17 June	Assessment	Project Plan: Please submit a copy to your supervisor and in the assessment box on Moodle
Week 10: 1 August - 5 August	Assessment	Literature Review and Project Plan/Progress: Submit document as a pdf to Moodle

Resources

Recommended Resources

- Start work on your topic as soon as you can. This will give you plenty of time to address problems that you may encounter on the way.
- Plan the progress of your thesis using, for example, a GANNT chart, and revise the plan as it proceeds.
- Start by performing a review of the available literature on research completed in the same area as your project. This will help you further define your topic and the direction your thesis will take.
- Order materials as soon as you are sure what you need.
- *EndNote* is bibliographic software that allows you to manage your references in a database. References can be inserted from inside MS Word documents to create in-text citations and bibliographies in various referencing styles. The program is available free to UNSW staff and students. Information and links are available through the UNSW Library: http://info.library.unsw.edu.au/skills/endnote.html.
- The Learning Centre has an "Honours thesis writing for engineering and science students" guide at: http://www.lc.unsw.edu.au/thesis/index.html

Does your thesis involve other people doing something for you? If so, it may require ethics approval.

The basic principle is that if you want people to provide you with something, even if just 5 min of their time to answer questions, then you should (i) treat them with suitable dignity and (ii) ensure any possibility that they may be badly affected is absolutely minimised.
When research at UNSW involves people, then it come under the oversight of the UNSW Ethics Committee which must give approval before it proceeds.

You will need to get approval, if your project involves any of the following (more than one may apply):

☐   a survey, even if done on-line

☐   an interview, focus group, or other such "qualitative" method

☐   data-mining, when individual identities might be revealed

☐   behavioural observation, e.g. people using something, choices people make, on-line activities

☐   recording or photography of people, even if in public spaces

☐   experiments on human reactions (or other abilities)

☐   human performance, e.g. running, falling, playing music

☐   testing a device

☐   tasting or smelling, e.g. foods

☐   and, of course, drug trials, body tissues and other medical activities.

Also, projects involving animals will need ethics approval.

If your project does require approval, in the first instance, discuss this with your Supervisor.

- If you have a question – ask!

UNSW Library website: https://www.library.unsw.edu.au/

Moodle: https://moodle.telt.unsw.edu.au/login/index.php

Course Evaluation and Development

Feedback on the course is gathered periodically using various means, including the UNSW myExperience process, informal discussion in the final class for the course, and the School's Student/Staff meetings. Your feedback is taken seriously, and continual improvements are made to the course based, in part, on such feedback.

Academic Honesty and Plagiarism

UNSW has an ongoing commitment to fostering a culture of learning informed by academic integrity. All UNSW students have a responsibility to adhere to this principle of academic integrity. Plagiarism undermines academic integrity and is not tolerated at UNSW. *Plagiarism at UNSW is defined as using the words or ideas of others and passing them off as your own.*

Plagiarism is a type of intellectual theft. It can take many forms, from deliberate cheating to accidentally copying from a source without acknowledgement. UNSW has produced a website with a wealth of resources to support students to understand and avoid plagiarism, visit: student.unsw.edu.au/plagiarism. The Learning Centre assists students with understanding academic integrity and how not to plagiarise. They also hold workshops and can help students one-on-one.

You are also reminded that careful time management is an important part of study and one of the identified causes of plagiarism is poor time management. Students should allow sufficient time for research, drafting and the proper referencing of sources in preparing all assessment tasks.

If plagiarism is found in your work when you are in first year, your lecturer will offer you assistance to improve your academic skills. They may ask you to look at some online resources, attend the Learning Centre, or sometimes resubmit your work with the problem fixed. However more serious instances in first year, such as stealing another student's work or paying someone to do your work, may be investigated under the Student Misconduct Procedures.

Repeated plagiarism (even in first year), plagiarism after first year, or serious instances, may also be investigated under the Student Misconduct Procedures. The penalties under the procedures can include a reduction in marks, failing a course or for the most serious matters (like plagiarism in an honours thesis) even suspension from the university. The Student Misconduct Procedures are available here:

www.gs.unsw.edu.au/policy/documents/studentmisconductprocedures.pdf

All students are expected to read and be familiar with UNSW Guidelines and Polices. In particular, students should be familiar with the following:

· [Attendance](#)   ·

· [UNSW Email Address](#)

· [Special Consideration](#)

· [Exams](#)

· [Approved Calculators](#)

· [Equitable Learning Services](#)

Disclaimer

This course outline sets out description of classes at the date the Course Outline is published. The nature of classes may change during the Term after the Course Outline is published. Moodle should be consulted for the up to date class descriptions. If there is any inconsistency in the description of activities between the University timetable and the Course Outline (as updated in Moodle), the description in the Course Outline/Moodle applies.

CRICOS

CRICOS Provider Code: 00098G

Acknowledgement of Country

We acknowledge the Bedegal people who are the traditional custodians of the lands on which UNSW Kensington campus is located.

Appendix: Engineers Australia (EA) Professional Engineer Competency Standard

Program Intended Learning Outcomes	
Knowledge and skill base	
PE1.1 Comprehensive, theory based understanding of the underpinning natural and physical sciences and the engineering fundamentals applicable to the engineering discipline	✔
PE1.2 Conceptual understanding of the mathematics, numerical analysis, statistics, and computer and information sciences which underpin the engineering discipline	✔
PE1.3 In-depth understanding of specialist bodies of knowledge within the engineering discipline	✔
PE1.4 Discernment of knowledge development and research directions within the engineering discipline	✔
PE1.5 Knowledge of engineering design practice and contextual factors impacting the engineering discipline	✔
PE1.6 Understanding of the scope, principles, norms, accountabilities and bounds of sustainable engineering practice in the specific discipline	✔
Engineering application ability	
PE2.1 Application of established engineering methods to complex engineering problem solving	✔
PE2.2 Fluent application of engineering techniques, tools and resources	
PE2.3 Application of systematic engineering synthesis and design processes	✔
PE2.4 Application of systematic approaches to the conduct and management of engineering projects	✔
Professional and personal attributes	
PE3.1 Ethical conduct and professional accountability	✔
PE3.2 Effective oral and written communication in professional and lay domains	✔
PE3.3 Creative, innovative and pro-active demeanour	✔
PE3.4 Professional use and management of information	✔
PE3.5 Orderly management of self, and professional conduct	
PE3.6 Effective team membership and team leadership	